[0024] Advantageous further developments are as set out in respective dependent claims in relation to each o the above aspects.

[0025] According to a further aspect of the present invention, there are provided computer program products, as set out in claim **27**, comprising computer-executable components which, when the program is run on a computer, are configured to implement and/or carry out the above method aspects. Those computer program product/products may be embodied as a computer-readable storage medium.

[0026] Thus, improvement is based on methods, apparatuses and computer program products according to at least one or more embodiments covered by the above aspects.

For Example:

[0027] At least some aspects of the invention relate to SON and in particular to an MRO implementation, and are effective to increase system performance by reducing unwanted handovers.

[0028] Reducing unwanted or even unnecessary handovers likewise improves a user's experience.

[0029] According to at least some aspects, it is implemented to take into account user mobility patterns. E.g. by analyzing a user environment (environment is to be understood in the broadest sense in terms of parameters descriptive of conditions prevailing for a mobile user when roaming in a network) over time (e.g. the user history), appropriate MRO parameters that can be used to begin a handover procedure are configured and/or adapted, so that handovers are reduced for users. In effect, it is presented, according to an aspect at least, an algorithm that analyzes the user's mobile route and that then adapts mobility parameters on a per user basis based on that user's mobile/mobility route. Analysis of user mobility route is based on data stored in some user mobility database.

[0030] The algorithm presented herein, i.e. the so-called UMAA-MRO algorithm, through analyzing user mobility data and some other factors, provides a precise way to find and configure appropriate handover parameters for UE on user route level, which can significantly reduce handover failures and avoid unnecessary handovers, thereby improving system performance and user's experience. It provides an assistive function to handover in self-optimization OAM systems, with all adjusted parameters being maintained in the respective ranges defined by operators and related standards.

[0031] The concepts as presented in line with aspects of the invention are applicable for an eNodeB or MME, for example.

[0032] More particularly, the concepts as presented in line with aspects of the invention will also be applicable to e.g. 3GPP LTE™ TR 36.902 version 9.3.1 Release 9 LTE™; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Self-configuring and self-optimizing network (SON) use cases and solutions, and lead to an updated version thereof.

[0033] Thus, with aspects of the present invention being implemented to e.g. SON networks, there are special parameters applied individually for each user to optimize HO scenarios and network performance. Namely, since most people do the same/similar things in the same period time of most days, their mobility routes or patterns are almost same in the days. Hence, according to an aspect of the invention, these routes/patterns and/or other similarities are identified, and based thereon, setting of appropriate HO parameters for the respective (individual) user can be accomplished, thus solving the issues above, and improving user's experience as well as system performance.

[0034] Aspects of the invention propose to set and update HO parameters for each user based on a user's mobility/location being tracked and/or its mobility history as e.g. expressed by a record of past handovers, and to combine those parts.

[0035] Aspects of the present invention relate mainly to MRO improvements, basing on user mobility and mobile environment to optimize handover (HO) parameters to enhance user HO success rate and reduce unnecessary HOs.

[0036] Aspects of the invention consider, among others, the parts measurement control, measurements report, handover preparation insofar as a source eNodeB configures UE measurement procedures, and UE triggers measurement reports according to the configured parameters, and then the source eNodeB makes HO Decision based on the Measurement Report and the Radio Resource Management (RRM).

BRIEF DESCRIPTION OF DRAWINGS

[0037] For a more complete understanding of example embodiments of the present invention, reference is now made to the following descriptions taken in connection with the accompanying drawings in which:

[0038] FIG. **1** illustrates an example of a user route pattern;

[0039] FIG. **2** illustrates an example of a user mobility data structure, based on e.g. such a pattern, and a graph resulting therefrom;

[0040] FIG. **3** illustrates a graph update procedure;

[0041] FIG. **4** illustrates an example of a signaling involved in a HO process based on an example of a UMAA-MRO,

[0042] FIG. **5** illustrates an example of a HO scenario; and

[0043] FIG. **6** illustrates an example of a basic block circuit diagram of a network entity such as a eNB or MME.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0044] Examples of aspects of the invention will be described herein below.

[0045] In various standards, different names may apply for those entities. Therefore, as a mere example only that was chosen to describe a possible implementation framework of the present invention, reference is made to LTE™ SON and related documents. Abbreviations and definitions as set out in such documents/context shall also apply for the purpose of describing at least concepts/embodiments of this invention, though those are not intended to limit the applicability of those concepts/embodiments to other telecommunication environments.

[0046] In brief, according to at least an aspect of the invention, a new MRO algorithm named herein UMAA-MRO (User Mobility Analysis Assistive MRO) is proposed, in which a User Mobility Database (UMD) and corresponding function module, i.e. control unit, are setup (e.g. in an eNB or a mobility management entity MME of the network) to analyze user mobility (e.g. current and past mobility) and (network) environment including route, time period, frequency, speed, weather, habit, etc, and help eNodeBs to select adaptive Time to Trigger (TTT), Hysteresis (Hys), Cell Individual Offset (CIO), Cell Reselection Parameters (CRs) for the User Equipment (UE) in user-level, i.e. individually per terminal